Improved Samplings for Whitefly Nymphs on Poinsettias

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This handout briefly summarizes our research results on sampling for whitefly nymphs on poinsettias. We have developed a new, more efficient sampling plan, called a "sequential" sampling plan. Sequential sampling plans do not directly estimate population levels, but are designed to provide control decisions based on specific pest thresholds. In other words, this type of sampling plan indicates whether a whitefly population is above or below a given level. Sequential sampling plans can provide information to make control decisions with minimal scouting costs, because a decision can usually be reached after inspecting relatively few plants. It is called "sequential" because you continue to inspect plants in sequence until you can classify an infestation as above or below the threshold. The number of plants that are inspected is variable. This sampling plan is designed to be used in conjunction with the IPM tactics outlined in "IPM for Poinsettias in New York: A Scouting and Pest Management Guide" (New York State IPM Program Publ. No. 403, 1993, Cornell Coop. Exten., Ithaca, NY 14853).

We have identified two tentative thresholds from the results of the New York statewide survey of whitefly nymphs on poinsettias at time of sale. Other thresholds may be more appropriate at certain periods of crop growth, or when natural enemies are used. The sequential sampling plan can be modified to incorporate such thresholds as they become available. Based on a sampling unit of six leaves per plant, the thresholds become 0.1 nymph per plant ("low" threshold) and 0.6 nymph per plant ("moderate" threshold) (see Table 1).

Validation studies. We used actual scouting reports from commercial greenhouses to validate these sampling plans. We wanted to determine whether the sampling plans indicated that control was needed when in fact it *was* needed (based on actual population counts). We also validated them for both greenhouse and sweetpotato whitefly.

Whitefly levels ranged from an average of 0.0 to 5.4 nymphs per plant in the data sets used for validation. The sequential sampling plans worked well for both whitefly species. For greenhouse whitefly, appropriate treatment decisions were made 94% and 100% of the time at the low and moderate thresholds, respectively. For sweetpotato whitefly, appropriate decisions were made in 94% and 95% of the cases for the low and moderate thresholds, respectively.

For greenhouse whitefly, the average number of samples required to make a decision was 13 for the low threshold, and 12 for the moderate threshold. For sweetpotato whitefly, an average of 12 samples were required to make a decision for both the low and moderate threshold. The previous sampling procedure in the New York Poinsettia IPM Program involved the inspection of 20 pots per every 2,000 pots. This sequential sampling plan will reduce sampling costs by about 40%.

Instructions for the Sequential Sampling Plan.

1. Sample from groups of about 2,000 plants. These groups are called pest management units (PMU's). A PMU could be all the plants in a small (<4,000 sq. ft.) greenhouse, or in a bay of a gutter-connected greenhouse, etc. Each PMU should be scouted separately.

2. Select plants to sample at random from throughout the entire PMU. Random sampling is impor-

tant for this plan to be accurate and to detect "hot-spots."

3. Inspect 6 leaves on each plant. As the plant canopy grows, inspect 2 leaves from the top, middle, and bottom part of the canopy, for a total of 6 leaves per plant.

4. Record the total number of nymphs in each life stage [i.e., small (1st & 2nd instars), medium (3rd instars), or large (4th instars, pupae)] for each plant on the scouting form (attached). Categorizing the nymphs into instars can be used for timing insecticide applications or perhaps natural enemy releases against appropriate instars.

5. Keep a running total of the number of nymphs that you have found as you inspect the plants. Record this cumulative number of nymphs on the scouting form (use the "Other" column). Compare this cumulative number of nymphs with the numbers in Table 1 after you inspect each plant. Continue to sample plants until you can make a control decision from Table 1.

6. To use Table 1, first decide on the threshold you want to use. (Two thresholds are provided: a "low" threshold of 0.1 nymph per plant, and a "moderate" threshold of 0.6 nymph per plant. These thresholds were derived from surveys of end-of-season whitefly levels on poinsettias in New York.) If the cumulative number of nymphs is above the upper limit, then the number of whiteflies on the crop is above the threshold, and you should consider a control measure. If the cumulative number of nymphs is below the lower limit, then the number of whiteflies is below the threshold, and control is not needed. (Note from Table 1 that you must inspect at least 14 plants to determine if you are below the lower limit for the "low" threshold, and at least 10 plants for the "moderate" threshold.) If the cumulative number of nymphs is between the upper and lower limit, then you must continue inspecting additional plants until the cumulative number of nymphs goes above or below the limits. See examples below.

7. Continue to sample each PMU weekly. Follow the general scouting guidelines outlined in "IPM for Poinsettias in New York: A Scouting and Pest Management Guide" (New York State IPM Program Publ. No. 403, 1993, Cornell Coop. Exten., Ithaca, NY 14853).

Examples:

1. After sampling 7 plants in a PMU, a scout has found no nymphs. On the eighth plant, 2 nymphs are found. If the "low" threshold is used, a total of 2 nymphs found after inspecting 8 plants is above the threshold of 1 nymph in Table 1. No more sampling is needed. A control measure should be considered.

2. In another PMU, the scout has looked at 14 plants, and has found no nymphs. Using the "low" threshold, Table 1 indicates that unless at least 1 nymph is found after inspecting 14 plants, the whiteflies are below the threshold. No more sampling is needed.

3. Another grower prefers to use the "moderate" threshold at the beginning of his crop. After inspecting 10 plants, the scout has found a total of 3 nymphs, which is between the upper limit of 11 nymphs and the lower limit of 1 nymph. A decision cannot be made, so the scout continues to inspect more plants. No more nymphs are found after inspecting 6 more plants, giving a total of 3 nymphs found on 16 plants. This lies below the lower limit of 4 nymphs in Table 1. Sampling can now stop; the whiteflies are below the threshold.

(This article was part of a presentation by Dr. John Sanderson at Grower Expo, January 8, 1994.)

Table 1. Upper and lower boundaries for sequential sampling plans for whitefly nymphs on poinsettias at two threshold levels

	Cumulative no. whitefly nymphs			
No. plants	"Low" Threshold[a]		"Moderate" Threshold[b]	
sampled	Upper limit[c]	Lower limit[d]	Upper limit[c]	Lower limit[d]
2	0	-	3	-
4	1	-	5	-
6	1	-	7	-
8	1	-	9	-
10	2	-	11	1
12	2	-	12	2
14	2	1	14	3
16	3	1	16	4
18	3	1	17	4
20	3	1	19	5
22	3	1	20	6
24	4	1	22	7
26	4	1	23	8
28	4	1	25	9
30	4	2	27	9
35	5	2	30	12
40	6	2	34	14
45	6	3	38	16
50	7	3	41	19
55	8	3	45	21
60	8	4	48	24
65	9	4	52	26
70	9	5	55	29
75	10	5	59	31
80	11	5	62	34
85	11	6	66	36
90	12	6	69	39
95	12	7	73	41

[a] "Low" threshold = 0.1 nymph / sample unit

[b] "Moderate" threshold = 0.6 nymph / sample unit

[c] Classify sample as "above threshold" if cumulative counts exceed the upper limit

[d] Classify sample as "below threshold" if cumulative counts are less than the lower limit

Cornell University IPM Program POINSETTIA SCOUTING DATA FORM #4

House/PMU _____ Scout _____ DATE _____

Plant Stage/Week Number _____ Time: IN _____ OUT _____

SITE	WHITEFLIES					
(Plant)	Eggs	Small	Med	Large	Adults	OTHER
# 1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
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19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
TOTAL						

Clean Plants (√)

Total # clean

Total # plants inspected

AVG. | | | | | | |

*Including clean plants

Predominant WF Species GH SP Mixed

GREENHOUSE MAP (_____X_____)

COMMENTS:

Pest Controls since last scouting:

YELLOW STICKY TRAP COUNTS

Card#	Days up	WF	Thrips	Aphid	F.G.	S.F.	Misc
TOTAL							
AVERAGE							